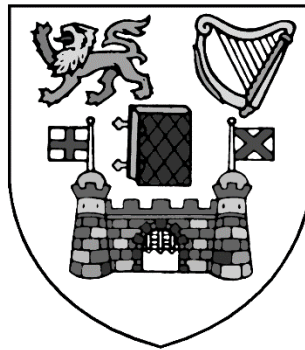


Safety Statement

The Department of Civil, Structural and
Environmental Engineering

Trinity College Dublin



This Safety Statement is adapted from a general Safety Statement for the Department of Engineering and all of its disciplines.

With thanks to the original authors October 2009

Updated December 2019: Civil Engineering Safety Officer

IN THE EVENT OF AN EMERGENCY RING 1999

The internal telephone number 1999 provides immediate access to professional assistance on a 24-hour basis. Be prepared to state:

1. Type of assistance required (ambulance, fire brigade, police etc.)
2. Type of emergency (fire, injury, etc)
3. Name, extension number and location.

If possible and safe to do so, stay close to the telephone, in order to give further information should it be required by the emergency services.

This number should only be used in a genuine emergency.

Safety Statement Introduction

To ALL

It is a requirement that all Staff, Undergraduate and Postgraduate students and Visiting Students and Researchers familiarise themselves with the Departmental Safety Statement, especially the sections relating to you. The Departmental Health and Safety Webpage can be found at <https://www.tcd.ie/civileng/facilities/safety-statement/> where you will find the Departmental Safety Statement.

The Table of Contents gives a very comprehensive overview of the Departmental Safety Statement. Once you have read the relevant sections of the statement you are required to sign the appropriate Acknowledgement Form. Information on training courses and schedules is available on the University Safety Office web site. <https://www.tcd.ie/estatesandfacilities/health-and-safety/>

Acknowledgement Forms

Instructions on how to complete these forms is given. Two forms as reproduced one for Staff and a second for Students including Summer/Occasional students. All forms must be completed and returned to the Departmental Safety Officer (Prof. David Igoe at igoed@tcd.ie).

Risk Assessment Forms

All staff, undergraduate, postgraduate and researchers who are physically undertaking a research project must complete a Risk Assessment Form. Completing a Risk Assessment for student projects and research is a College requirement. It is it duty of all staff supervising projects to ensure that the student has fully completed the form. The Supervisor/Principal Investigator is then required to sign the form. Guidance on how to complete a Risk Assessment and the form is reproduced in the safety statement. All signed forms must be sent to the Departmental Safety Officer (Prof. David Igoe at igoed@tcd.ie).

Accident/Incident Report Forms

All accidents that occur in the Department i.e. in the Laboratories, computer rooms, research areas, offices and all public areas must be reported to the Departmental Safety Officer (Prof. David Igoe at igoed@tcd.ie) using the prescribed form. Finally, the College hosts unscheduled fire drills during the year. It is a requirement that ALL staff and students fully comply: Staff/Students must follow the Instruction of the Fire Wardens and evacuate the building to the designated assembly area. For the Simon Perry and adjoining Redbrick building this is in the car park beside the ruby pitch. Staff with visitors must ensure that their visitors are safely escorted from the building to the designated assembly areas.

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Departmental Staff contact details related to safety

Title	Name	Email	Telephone ext.
Head of School	Prof Henry Rice	hrice@tcd.ie	1996
Head of Department	Prof Aonghus McNabola	amcnabol@tcd.ie	3837
Department Safety Officer	Prof David Igoe	igoed@tcd.ie	3805
Chief Technical Officer	David McAulay	damcaley@tcd.ie	2386/1010
Carpentry	Michael Grimes	michael.grimes@tcd.ie	2388
Concrete Laboratory	Michael Grimes	michael.grimes@tcd.ie	2388
Environmental Laboratory	Pat Veale	vealep@tcd.ie	2045
Hydraulics Laboratory	Robert Fitzpatrick	robert.fitzpatrick@tcd.ie	2388
Lecture Theatre	Mark Gilligan		2386
Workshop	David McAulay	damcaley@tcd.ie	2386/1010
Structures Laboratory	David McAulay	damcaley@tcd.ie	2386/1010
Surveying	Michael Grimes	michael.grimes@tcd.ie	2388
Vibrations Laboratory	Mary O'Shea	mary.oshea@tcd.ie	8578
Geotechnical / Soils Laboratory	Eoin Dunne	edunne@tcd.ie	1009
First Aid	Mary O'Shea Alan O'Connor	mary.oshea@tcd.ie oconnoaj@tcd.ie	8578 1822

College Special Hazards Officers

The following members of staff have been appointed by the Board as specialist advisors in the fields outlined below. They advise the College Safety Officer, Local, Faculty and College Safety Committees & the College Community in general on matters relating to their respective fields. If you have a query in relation to safety in the use of lasers, radioactive materials, biologically hazardous materials, fire safety or hazardous chemicals, the relevant specialist in College can be contacted at the Tel #'s or addresses shown.

<p>College Safety Office, Estates & Facilities, West Chapel. Tel: 896 4000 Email: estatesandfacilities@tcd.ie</p>	<p>Head of Safety Dr Katharine Murray Estates & Facilities, West Chapel. Tel: 896 1914 Email: Katharine.Murray@tcd.ie</p>
<p>Safety Officer – Biological Hazards Dr Mary McDonnell Estates & Facilities, West Chapel. Tel: 896 3965 Email: mmcdonn8@tcd.ie</p>	<p>Bio-Safety and Genetic Manipulation Dr Henry Windle Clinical Medicine Tel: 896 2211 Email: hjwindle@tcd.ie</p>
<p>Safety Officer – Radiological Protection Dr Gillian Gunning Estates & Facilities, West Chapel. Tel: 896 2887 Email: gillian.gunning@tcd.ie</p>	<p>Hazardous Chemicals Prof Robert Baker Chemistry Department, Chemistry Building, College tel: 896 3501 Email: bakerrj@tcd.ie</p>
<p>Safety Officer – Fire Safety Mr. Karl Flynn Estates & Facilities West Chapel. Tel: 896 3545 Email: karl.flynn@tcd.ie</p>	<p>Laser Safety Mr Christopher Smith Department of Physics, SNIAM, College Tel: 896 3649 Email: chsmith@tcd.ie</p>

Section I - General statement of Department Safety Policy

The Department of Engineering encompasses the following Disciplines (i) Electronic & Electrical Engineering (ii) Civil, Structural & Environmental Engineering (iii) Mechanical & Manufacturing Engineering. It is the policy of the Department to ensure, in so far as is possible, the health, safety and welfare of all its staff and students in accordance with the College Safety Policy, the Safety, Health and Welfare at Work Act of 2005 and relevant, later, subsidiary legislation and statutory instruments. All reasonable steps will be taken to ensure that no person's – be it staff, students or others – health, safety and welfare is put at risk by, or as a result of the activities of the Department or its various disciplines.

In so far as reasonably possible, adequate resources in relation to health, safety and welfare matters will be made available. Both proactive and reactive approaches towards health, safety and welfare will be taken. The Department will ensure that it meets its objectives for health, safety and welfare of:

- establishing a safe environment for all;
- establishing and maintaining safe working procedures for staff and students;
- encouraging health and safety as an integral part of work by all staff and students;
- developing and maintaining a safety consciousness and a safety culture in all within the Department;
- conforming to the requirements laid down in the Safety, Health and Welfare at Work Act.1989, any further provisions made under the Act, other applicable legislation and the College Safety Statement, College Policies and Codes of Practice documents.

Aonghus McNabola (Head of Discipline)

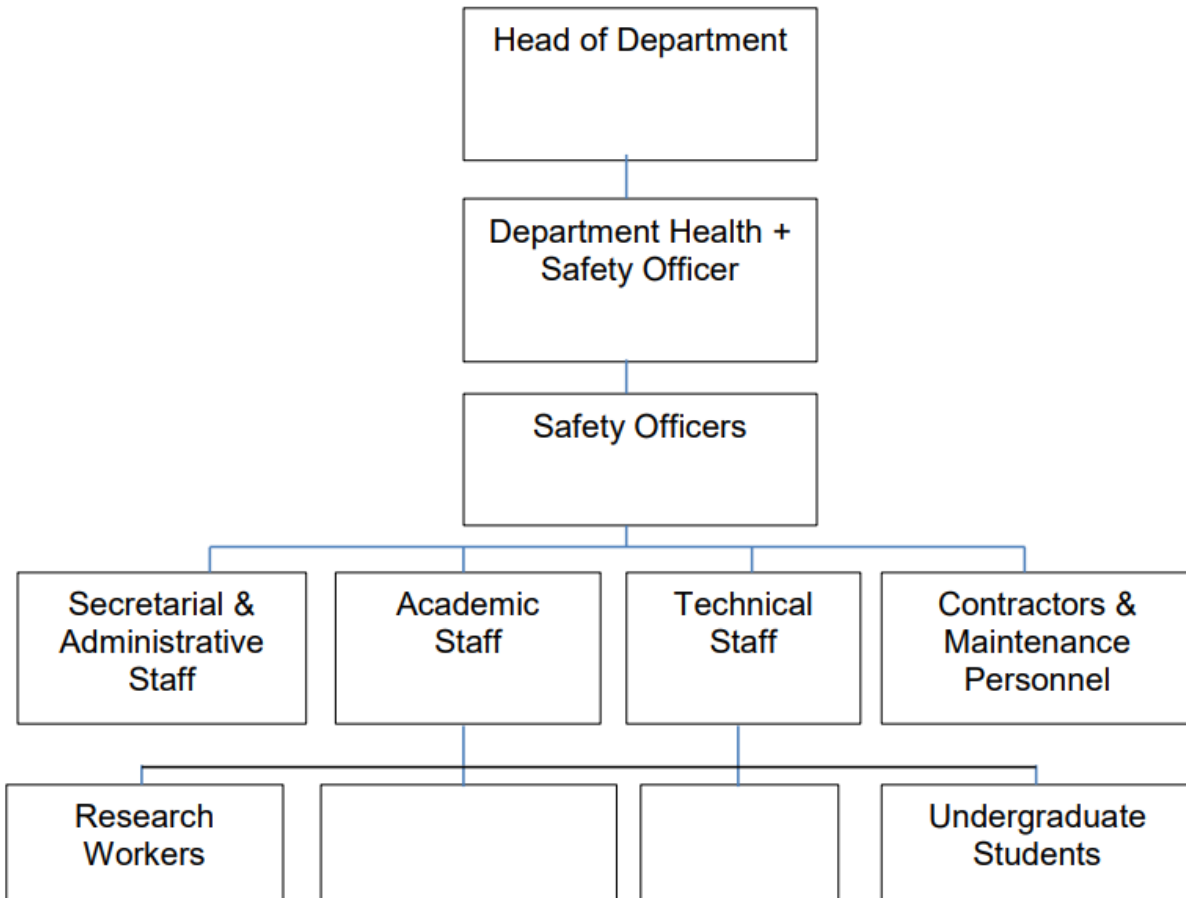
Date: 29/11/2019

1.1 Safety Responsibilities and Duties

All personnel (staff, students and visitors) have a personal responsibility to ensure the Health and Safety of themselves and of others who may be affected by their activities within the Department of Engineering and its various disciplines.

1.2 Executive Responsibilities

The Head of Department is responsible for safety in the Department. He/She will appoint another member of staff of the Department to act in their absence, and a record of the name of this acting Head of Department will be retained in the office of the Department. The Department Safety Officer (DSO) has executive responsibility for safety and reports to the Head of Department. He/She is supported by the Chief Technical Officer. The organisation chart for health and safety within the Department is given below.



1.3 Monitoring Safety Performance

All personnel within the Department have a responsibility to contribute to the continuous monitoring of safety performance within the Department. On a day-to-day basis this can be achieved by forwarding

comments, queries and complaints on safety matters to the Departmental Safety Officer or Chief Technical Officer.

In pursuance of the safety policy of the Department, the Departmental Safety Officer will carry out regular safety inspections (at least once per calendar year) and maintain appropriate written records. The results of these inspections will be discussed at Departmental staff meetings.

Any deficiencies in equipment or procedures must be rectified promptly.
Where equipment is deemed to be unsafe **it must not be used** until corrective action is taken.

The Department Safety Officers (DSO) will maintain detailed records of all accidents, injuries, property damage and near misses. These reports must be sent to the College Safety Office. These reports will be discussed at the regular meeting of the Faculty of Engineering, Maths and Science Safety Committee with a view to establishing why and where the safety performance was inadequate.

The Departmental Safety Officer will conduct periodical Safety Audits of the Department in collaboration with the Chief Technical Officer and the College Safety Officer, and reports on these audits will be given to the Head of Department.

1.4 Safety training

A variety of safety training courses are organised throughout the year by The College Safety Office and the Dept. actively encourages participation. Fire safety training is mandatory for demonstrators and Technical Officers working in undergraduate teaching labs. Additional training may also be mandatory for personnel working in special hazards areas.

Details of scheduled Safety Training courses can be found on the College Health & Safety website:
<https://www.tcd.ie/estatesandfacilities/health-and-safety/Safety-Training/>

Section II – General Safety for the Engineering Department and its Buildings

The following are the general safety rules which apply to all personnel within the Department including staff, students and visitors.

Note: All accidents must be reported to either the DSO or the Chief Technical Officer who will complete the statutory 'Accident Form', a copy of this form is then sent to the College Safety Officer who registers all accidents in College

Additional more specific safety rules apply to the personnel working in the following areas:

- Undergraduate Teaching Laboratories,
- Workshops.
- Research Laboratories.

2.1 Access to Simon Perry and Redbrick Buildings

The normal opening hours for the department are 08:00 – 17:00 hours, Monday to Friday.

Although free access is available to most Department buildings during normal working hours, access outside normal working hours is limited strictly to authorized staff, postgraduate students, authorised students, visitors and contractors. Contractors & maintenance personnel must be made aware of the hazards in the areas to which they are admitted and hence must report their presence to the Chief Technical Officer.

2.2 Visitors.

- Visitors to the Department/Discipline must immediately contact their staff host (or the Discipline office) on entering the Building. Staff, who have visitors, are responsible for ensuring that their visitors are aware of all safety rules, are fully aware of local fire evacuation procedures and have been informed of any special risks associated with the area being visited.
- Visitors who are not technically qualified must not be left unattended in any laboratory.
- Casual visitors should go to the Enquiries/Main Office of the Discipline.
- Transition year students who may be temporarily attached to the Department will be classified as visitors.

2.3 Disabled Persons

Before entering any of buildings in any the various disciplines Physically Disabled persons should be fully informed of the following Emergency Procedures.

Progressive Horizontal Evacuation or Lateral Evacuation will be practiced where there is no alternative means of evacuation from the upper floors of a building and where no Fire Lift or Evacuation Lift is installed. All Lifts must be clearly Identifiable with Visible Signage. Physically Disabled occupants will be moved horizontally within the building away from the hazard and brought to a safe refuge location if

available. A 'Buddy System' should apply whereby the staff member concerned will be responsible for the disabled Visitor/Student. Disabled Visitor(s)/Student(s) may be left for the arrival of the fire brigade to execute complete evacuation. **The staff member concerned must inform the fire service of the person's location.**

All visitors, contractors & maintenance personnel must comply with the Safety regulations.

2.4 EMERGENCY 1999.

The internal telephone number 1999 provides immediate access to professional help on a 24-hour basis. This number should only be used in an emergency.

2.5 Fire safety

The legislation governing fire safety in the Department is the Fire Services Act of 1981 and 2013, Building Control Regulations of 1997 and Building Regulations 1997 (Technical Guidance Document B – Fire Safety 2006).

When a fire alarm sounds all personnel must immediately leave the building using the nearest available exit route (or the exit route specified by local fire wardens). In the event of an emergency evacuation all personnel must obey, promptly, all instructions given by the fire warden/Safety officer.

- Emergency exit routes are clearly indicated on all corridors.
- Escape routes are lit by emergency lighting in the event of failure of the electricity supply.
- Lifts must not be used during emergency evacuation.
- After evacuation go directly to the designated assembly point which should be clearly indicated. Do not congregate at the building entrance.

2.6 Fire drills

Fire drills are held twice during each calendar year and are attended by the College Fire Officer and or Safety Officer, and by members of the College security staff. Drills are held without prior warning and during working hours when the building occupancy is likely to be high. Security staff will check each building for defaulters before the all clear is given. A written record of each fire drill is maintained, indicating the date, the approximate number of persons evacuated from the building, and the time taken for complete evacuation.

2.7 Fire wardens.

The Fire wardens for the Civil Engineering Department as detailed on page one of this safety statement.

2.8 Fire Alarm and Evacuation Procedures.

The Buildings are provided with an automatic fire alarm system, which is regularly tested by the College Buildings Office. The fire alarm can be manually triggered from any of the several break-glass alarm boxes, which are placed in strategic areas around each Building. In the event of a fire the fire alarm system should be activated immediately and the building evacuated. Persons in charge of lecture theatres and teaching labs should assist with the evacuation of their areas.

ASSEMBLY POINT - Museum Building B Simon Perry Building & Redbrick Civil Eng Building D (Rugby pitch car park).

2.9 Firefighting equipment

College appointed professional fire control companies carry out regular inspection, renewal and servicing of fire extinguishers under the direction of the College Buildings Office.

Any person who has used one of the Building's fire extinguishers, even for a very short time, must report the fact immediately to the Department Safety Officer or Chief Technical officer, so that it can be fully recharged or replaced. Additionally, an Accident/Incident Report Form must be completed in respect of each such use of any fire extinguisher.

Frivolous & unauthorised use of any fire-fighting equipment is a criminal offence and will be dealt with most severely.

2.10 Action in the event of fire

If any member of the Department discovers a fire the following actions must be taken. The person discovering the fire will:

- Provided that to do so does not compromise their personal safety, briefly attempt to extinguish the fire using the equipment provided.
- Activate the Fire Alarm
- Leave the building and call for help (the College Emergency Number is 1999)

The Department recognises the special hazards in certain areas, which the use of compressed gases presents to fire service personnel. The department will seek to reduce these as follows:

- It will pursue, as far as is practicable, a policy of piping in gases rather than keeping gas cylinders on the premises.
- It will keep records of the main hazards relating to cylinders of compressed gases in each area of the building. These will be kept at the Chief Technician's office and sent to the Chief Steward's office.

2.11 Fire Doors.

Fire doors must not be left open under any circumstances.

2.12 First Aid.

It is the policy of the Department that first aid will not take the place of professional treatment. In the case of minor injuries such as cuts or burns, assistance may be sought from members of the Staff who have valid First Aid Certification. Those currently qualified in First-Aid should be listed at the beginning of this Safety Statement.

For more serious injuries the person injured will be accompanied to the College Health Centre or an ambulance will be summoned.

2.13 First aid boxes

First aid boxes will be kept in all laboratories and workshops. Names and telephone numbers of the nearest personnel with First Aid expertise should be posted on all First Aid Stations, as is the College emergency number and that of the College Health Centre.

First aid Stations will be maintained by the Chief Technical Officer who will at regular intervals check that the contents of each box is in order, and replace missing or outdated items.

The department will carry a stock of commonly used first aid materials which will be employed to replace items necessarily used. These will be available from the Chief Technical Officer.

2.14 First aid training

It is the policy of the Department to encourage volunteers from the permanent staff and postgraduate students to attend First Aid courses.

2.15 Hazardous Areas.

Areas within the Department, which contain potentially hazardous equipment and/or substances, must be clearly marked with warning signs. Access to these areas is prohibited for unauthorised personnel.

Notices describing the hazards present in a laboratory are displayed on the exterior of its door. Before entering a laboratory, it is the duty of each person to acquaint themselves of the hazard/s present and to don the appropriate safety clothing or devices necessary for personal protection.

2.16 Working hours.

The normal opening hours for the department are 08:00 – 17:00 hours, Monday to Friday.

Outside normal opening hours is limited strictly to authorized staff, postgraduate students, authorised students, visitors and contractors. Contractors & maintenance personnel must be made aware of the hazards in the areas to which they are admitted. The only circumstances in which those other than staff members, postdoctoral workers, graduate & undergraduate students and accompanied visitors that will be permitted outside the above hours are as follows:

- i. Persons attending evening lectures
- ii. Persons attending society meetings
- iii. Security Staff
- iv. Cleaning Staff
- v. Maintenance Staff
- vi. Persons with special permission of the Head of Department

Any student carrying out experimental or project work outside normal working hours must have prior permission from their supervisor.

2.17 Working in Isolation.

Working on experimental systems or machinery outside normal working hours is not permitted without prior authorization of the project supervisor or person-in-charge after he/she has conducted a full assessment of risk and devised a safe system of work. **No staff member, postdoctoral worker or postgraduate student will be permitted to carry out experimental or technical work of any kind in the**

Department or any of the buildings used in areas of activity at any time unless there is another person close by, who is aware of their presence so that they can summon assistance in the event of an accident.

Isolated individuals must never carry out potentially hazardous work or activities.

2.18 Clearways.

As far as is practically possible all entrances/exits, corridors, stairways and doorways must be kept clear of obstructions. All temporary obstructions (e.g. during movement of large equipment or maintenance work) should be notified to the Department Safety Officer who will designate alternative temporary emergency exit routes.

2.19 Electrical Switch Rooms/Plant Rooms.

These rooms must be kept clear of obstructions at all times. Access to these areas must be kept clear.

2.20 Reporting of Hazards.

All personnel using Departmental buildings have an individual responsibility to report, directly to the Discipline Safety Officer or Chief Technical Officer, all potential hazards and/or hazardous occurrences, which they may observe. Undergraduate students who observe hazard/s may report to their class representatives who in turn will report to the Department Safety Officer.

2.21 Reporting Accidents and Dangerous Occurrences.

All accidents, incidents and dangerous occurrences, even those of a minor nature, must be immediately recorded and reported on the official University Accident Reporting Form (Appendix II). Details of witnesses to the accident/incident, if any, will also be noted if necessary. When completed, a copy of the form should be forwarded to the Departmental Safety Officer (for information and follow up action), the University Safety Officer (for information, and advice re: future prevention) and Pat McDonnell, Estates & Facilities, West Chapel (for insurance purposes). A copy of the Accident/Incident form should be filed in the Departmental Accident Record Book held by the Chief Technical Officer.

If a member of staff is absent for greater than 3 working days as a result of an occupational accident or an occupational related illness, the Head of Department must specifically advise the University Safety Officer, as a separate mandatory report must be made to the Health and Safety Authority

Section III - Safety rules for Teaching Labs & Lecture Theatres

The general safety rules and procedures, which apply to all personnel within buildings, including staff, students and visitors, are detailed in the GENERAL SAFETY RULES section of this document. The following rules apply specifically to all personnel (including staff, demonstrators, and undergraduate students) who are authorised to enter and work in the teaching laboratories and lecture theatres of the Department.

3.1 Training

As indicated previously, all teaching assistants, demonstrators and all staff must have completed a Fire safety training course. These courses are organized by the College Safety Officer and details may be obtained from the Department Safety Officer.

3.2 General laboratory rules

- Incoming students must read and abide by the Health and Safety Guidance Manual issued by the Department. A statement to this effect will be inserted into all student information booklets.
- Guidance for the use of hazardous equipment, materials and procedures (such as lasers, chemicals or electrical equipment for example) may be found in the Safety Statements of the respective Disciplines.
- Coats, bags etc must not be left on lab benches or anywhere that they could cause an obstruction.
- Students are not allowed to work unsupervised without the explicit permission of the lab supervisor.
- Students should not congregate at the entrance to a laboratory or lecture theatre, or at building entrances.
- Students should be made familiar with these rules by the person in charge of the lab or lecture theatre.
- A Risk Assessment must be completed for each process. See APPENDIX III.

Section IV: Safety rules for Offices, Research Labs & Workshops

The general safety rules and procedures, which apply to all personnel within Department buildings, including staff, students and visitors, are detailed in the GENERAL SAFETY RULES section of this document. The following rules apply specifically to all personnel (including staff, post-graduate research students, visiting researchers and undergraduate project students) who are authorised to enter and work in research laboratories (additional rules apply for bioengineering labs, section IV) within the Department.

4.1 Responsibility

Overall responsibility for health and safety within the Department rests with the Head of Department. Although at a local level the responsibility for ensuring a safe working environment and safe working practices in individual research laboratories rests mainly with the individual research supervisor, or person in charge of the laboratory, all research workers have a responsibility not to endanger themselves and others by their actions or omissions.

4.2 Specialist safety consultants

In areas where specific identified hazards exist (lasers, chemical, electrical etc.), specialist safety consultants will be designated. These should be consulted prior to undertaking any work in these areas.

4.3 Authorised access to research laboratories

Access to each individual research laboratory is strictly limited at all times to those individuals authorised by the appropriate research supervisor or person in charge. In the case of visiting researchers and new staff the research supervisor is responsible for ensuring that the appropriate safety training is provided, if necessary by specialist safety consultants, before laboratory access is authorised. Laboratories which contain specific identified hazards (e.g., laser systems, hazardous substances etc.) must be clearly marked with warning signs. Access to such areas is strictly limited to authorized personnel with the appropriate training and expertise. For such areas prior authorisation must be obtained from the research supervisor before visitors or other unauthorised personnel are permitted to either enter the laboratory or undertake any work within the laboratory.

4.4 General Laboratory Practice

1. All researchers have a responsibility to maintain a tidy well organised and safe laboratory environment with a safe means of rapid access to and egress from all working areas. Access to all services (water valves, electrical fuse boxes/switches etc.) should be kept clear at all times.
2. All experimental systems should be designed to be fail-safe.
3. **All researchers should carry out a detailed assessment of the likely hazards and risks associated with their experimental systems and procedures. Research supervisors have a responsibility for ensuring that such systems and procedures meet the appropriate safety standards.**

Research supervisors must keep written records of risk assessments carried out and provide, where necessary, appropriate written work instructions and additional written local safety rules. The essential steps that are taken in order to complete a risk assessment are as follows:

- Identify the hazards to health or safety arising from the activity or the workplace.
- Decide who might be harmed and how.
- Evaluate the risks and decide whether existing precautions are adequate or more needs to be done.

- Record your findings.
- Review your assessment and revise it if necessary.

A guidance document on the preparation of a risk assessment is available from College Safety Office.

4. A copy of the risk assessment should be lodged with the Department Safety Officer. If in any doubt consult the appropriate safety consultant.
5. All researchers have a personal responsibility to make correct and full use of all protective clothing, personal protection equipment and safety aids provided in order to minimise risks.
6. Researchers must not attempt new procedures or tasks without consulting their supervisor and receiving appropriate safety training.
7. All researchers within a laboratory should be kept fully aware of day-to-day modifications carried out on experimental systems or operating procedures and clearly visible warning notices of any resulting potential hazard must be provided.

4.5 Unattended experiments/apparatus

Systems should not be left running unattended without consulting with the relevant research supervisor. Where systems operate unattended for any period of time, an UNATTENDED APPARATUS form must be completed and clearly displayed beside the equipment. This notice must be removed when the condition no longer applies.

When carrying out the risk assessment for such systems, special attention should be given to the effects of a loss of services (water, electricity etc.) on the safety of the system.

4.6 Computers & VDU Equipment

A booklet, outlining the correct use of VDU equipment, is available from the Department Safety Officer. Personnel using VDUs should consult this booklet.

Any users of VDU equipment who experience health problems, which they feel may be associated with their working environment or facilities, should contact the Student Health Centre for advice. If necessary a full ergonomic risk assessment will be carried out.

4.7 Protective Clothing and Personal Protective Equipment

It is the policy of the Department that, where necessary, staff and students should be provided with protective clothing and personal protective equipment. Provision of protective clothing (lab coats, overalls, aprons, gloves) is the responsibility of the research supervisor.

4.8 Laser safety consultation (*College Laser Safety Officer*).

The NSAI determines the regulations governing the safe use of lasers, these are defined in Irish Standard IS EN 60825-1:2014 (+AC:2017-06).

All members of staff and postgraduates who work with potentially hazardous laser equipment (Classes 3B or 4) must undertake the College 'Laser Safety Training course', details from Discipline or College Laser Safety officer.

More details are available on <https://www.tcd.ie/Physics/research/facilities/oal/laser-safety/>.

Postgraduate workers must satisfy their supervisors that that they have taken the safety course and are competent to use laser equipment. Evidence of attendance shall be given to the Discipline. Safety Officer. It is the responsibility of research supervisors to ensure all relevant safety precautions have been met.

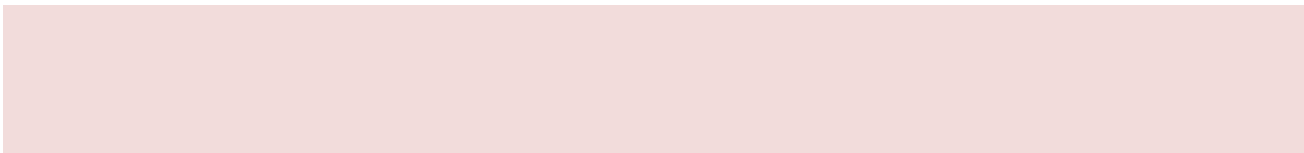
Guide to Laser Classes

- Class 1: Incapable of producing damaging radiation levels, and thus exempt from beamhazard control measures. Class 1M is potentially hazardous if viewed with collecting optics (e.g., telescope)
- Class 2: Usually safe for accidental exposure, but often handled with the aid of eye protection. Class 2M is potentially hazardous if viewed with collecting optics.
- Class 3R (visible spectrum: ≤ 5 mW as continuous wave (CW) or ≤ 0.004 mJ pulsed): Potentially hazardous under certain viewing conditions and when the eye is properly focused and stable, but the probability of an actual injury is small, so they have reduced controls. Class 3R lasers will not pose either a fire hazard or diffuse reflection hazard, meaning that a change in the spatial distribution of a beam by scattering in various directions does not pose any significant threat.
- Class 3B (visible spectrum: 5-500 mW as CW or 0.004-30 mJ pulsed): More hazardous and relatively unsafe under direct and specular reflection viewing conditions, even unfocused. A Class 3B laser product, however, is normally not a fire hazard, diffuse reflection hazard, or a laser generated air contaminant (LGAC) production hazard.
- Class 4 (visible spectrum: >0.5 W as CW or >30 mJ pulsed): Most hazardous. Class 4 lasers are unsafe when a direct beam is exposed to the eye or skin. Furthermore, this laser can pose a fire hazard or diffuse reflection hazard, and it can also produce LGAC and even hazardous plasma radiation.

Summary of precautions in use

Precautions and hazards	Class 1 - 2	Class 3R	Class 3B	Class 4
Safety training (see above)	Not required		Required for operator & maintenance personnel	
Remote lock	Not required		Connect to room or door circuits	
Key control	Not required		Remove key when not in use	
Beam attenuator	Not required		When in use prevents inadvertent exposure	
Emission Indicator	Not required		Indicates laser is 'ON'	
Warning signs	Not required		Follow precautions on signs	
Beam path	Terminate beam at end of useful length			
Eye protection	Not required		Required	
Protective clothing	Not required		Specific requirements may apply	
Specular reflection	No risk		Hazard to eyes	Hazard to eyes and skin
Diffuse reflection	No risk		Limited risk	Hazard to eyes and skin
Fire risk	No risk			Fire hazard with combustible materials

In the case of a laser Accident:



- Get immediate medical attention at the **Royal Victoria Eye & Ear Hospital**. Adelaide Road. Dublin 2
- **Do not** use the laboratory or disturb the equipment until after an accident investigation has been performed.
- **Report all** laser accidents to the Departmental Safety Officer.

4.9 Chemical safety consultation (*Chemicals & Biohazards Officer*).

The use of dangerous chemicals is strictly controlled by specific legislation, *Safety, Health & Welfare at Work (CHEMICAL AGENTS) Regulations, 2001*. The Regulations cover all chemical agents in the workplace. In particular it applies to chemicals, which are classed as very toxic, toxic, harmful, corrosive or irritant. In brief the Regulations require each Discipline:

- To assess the health risks which arise from hazardous substances in the workplace and to identify and provide effective controls to protect people's health.
- To ensure that the controls are properly used and maintained in effective working order.
- To provide training and information for those who may be affected.
- To monitor exposure and implement health surveillance where necessary.

A copy of the regulations is available from the Department Safety Officer. A code of practice for the legislation is also available.

The following rules and procedures apply for all work involving chemical agents within the Department:

- 1) Hazardous substances may not be ordered (or otherwise procured) before a suitable and sufficient risk assessment has been carried out.**
- 2) Hazardous substances or chemicals may only be procured through the Chief Technical Officer on foot of a signed requisition from the research supervisor.**
- 3) Chemical safety training is given as part of the annual Discipline safety day. No one may work with hazardous chemicals without having completed the Departmental safety course or an equivalent.
- 4) All personnel using a particular chemical should read the manufacturer's Material Safety Data Sheet (MSDS) for that chemical.
- 5) Sheet (MSDS) for that chemical.
- 6) All work involving chemicals should, as far as is reasonably practical, be carried out in a fume hood making full use of the safety goggles, safety clothing and other safety aids provided.
- 7) For work requiring use of a fume cupboard, users must at all times adhere strictly to the guidelines for correct fume cupboard usage.
- 8) Suitable bottle carriers must be used, when transporting Winchester, Quart and Euro-bottle containers of chemical substances, in order to prevent accidental spillages and personal injuries.
- 9) All stocks of chemicals or hazardous substances used in each Discipline must be properly stored in suitable chemical storage presses.**
- 10) All chemicals or hazardous substances used in the Department must be clearly labelled including warning signs.**
- 11) All chemical waste must be clearly labelled and disposed of promptly through College's Hazardous Materials Facility (HMF). Containers sent to the HMF should be no more than 2/3 full.
- 12) Solvent waste should be divided into chlorinated and non-chlorinated waste (and kept apart from acid waste!). Special safety-cans for solvent waste may be obtained from the HMF.
- 13) All broken glassware and other "Sharps" should be disposed of in the Sharps bins provided. Bins containing contaminated sharps should be labelled and disposed of via the HMF

4.10 Compressed gases safety.

With compressed gases cylinder pressures may be as high as 300 bar and the gas or gas mixture may be flammable and/or toxic so great care must be exercised in their storage, handling and use. In addition the use of some gases will also be subject to the Chemical Safety Rules given above.

Flammable or Explosive Gases constitute a particular hazard within the laboratory environment. Guidance for use of such gases is provided in **CP8 - The Safe Storage of Gaseous Hydrogen in Seamless Cylinders & Similar Containers: 1986**, produced by the British Compressed Gases Association. Such gases may be used only after appropriate local safety rules and procedures have been established by the research supervisor, in consultation with the College Safety Officer.

Such rules and procedures must be formally recorded and clearly displayed along with appropriate warning notices at all entrances to the designated work area. The following safety rules apply for all compressed Gases:

- 1) All users of compressed gases must be fully familiar with the appropriate manufacturer's identification codes and cylinder configurations.
- 2) Only staff and students who have carried out the Gas Safety Awareness Training Course and have received their certification can connect/disconnect and move gas bottles.
- 3) Never remove or deface cylinder identification.
- 4) Store cylinders vertically and clamp securely to prevent toppling. Cylinders must not be left free standing at any time.
- 5) Store in a well-ventilated area away from any fire risk.
- 6) Valves should be closed and valve outlets plugged or blanked. Valve guards or caps should be securely fitted.
- 7) Separate cylinders of flammable gases from those of oxygen or oxidants by at least 3m.
- 8) Cylinders may not be used in a laboratory except by permission of the College Safety Officer. Only those cylinders, which are in current use, may be kept within the laboratory. Do not store cylinders in the laboratory.
- 9) Where possible pipe gases from a secure location outside the laboratory.
- 10) Ensure that you have read a current Material Safety Data Sheet (**MSDS**) for each gas in use in your laboratory and that these are clearly displayed either on or adjacent to the cylinder.
- 11) A "Compressed gas cylinder in use" form (Appendix V), listing all the compressed gas cylinders currently in use must be displayed outside the entrance to all laboratories containing compressed gases. A compressed gases warning sign (Appendix V) must also be displayed.
- 12) In rooms where flammable or other hazardous gases are in use, appropriate signage must be displayed on the room entrances.
- 13) Always use the appropriate trolley to move heavy cylinders.
- 14) Only suitably equipped and trained personnel may move gas cylinders or fit regulators.
- 15) Gas cylinders should not be transported in occupied lifts.
- 16) Use only approved regulators. Check their suitability for the gas in use.
- 17) It is recommended that regulators are either replaced or refurbished after (at maximum) 5 years from date of purchase.
- 18) Before connecting the cylinder to your apparatus check the complete system for suitability particularly in terms of pressure rating and materials compatibility. All new pipe work should be inspected and leak tested by qualified personnel.

- 19) Never transfer gas from one cylinder to another.
- 20) Report all faulty cylinder valves and regulators immediately to the Chief Technical Officer.
- 21) Always close the main cylinder valve when a cylinder is not in use and ensure that an appropriate cylinder key is readily available for rapid shut down of cylinder output.
- 22) All compressed cylinder gases should be ordered through the Chief Technical Officer on foot of a signed requisition from the research supervisor.

In addition to the above, the use of gas cylinders is governed by the protocol in Appendix V. Gas cylinders may not be used until all the necessary paperwork is completed.

4.11 Empty Cylinders

Empty cylinders are not truly empty. They contain gas at atmospheric pressure. Thus the cylinder still contains gas at a pressure of at least 1 bar. Depending on cylinder size, this can be a substantial quantity of toxic or flammable substance. It is important to ensure that gas containers are in a safe condition after use.

Before returning empty gas containers, a check should be carried out to ensure that:

- the cylinder valve is closed and not leaking.
- the cylinder valve outlet plug or cap nut, if supplied, has been securely refitted. This is particularly important if the contents of the container are toxic

More information can be found in the BOC booklet '*Safe Under Pressure*'.

4.12 Mechanical safety consultation (*Local Chief Technical Officer*).

The guarding of dangerous parts of machines & machine tools is a legal requirement (British Standard BS5304 - Safety of Machinery provides a guideline). All the equipment in our Workshop's comply with the standard. However, machine tools are potentially the most hazardous pieces of equipment and great care must be exercised in their use. Local specific safety rules apply to technical staff normally working within the Workshops and they have been trained in the use of the full range of workshop equipment. The following rules therefore apply only to research workers and students who enter a Workshop.

1. Any person entering a workshop, while machining is in progress, should wear the safety glasses provided.
2. Persons entering a workshop must not directly approach anyone operating machinery, but should wait until someone is available for consultation.
3. Only suitably qualified staff are permitted to operate the main workshop machinery.
4. Permission may be given, on an individual basis, for some undergraduate & postgraduate students to operate a limited range of machinery. This is granted by the Chief Technical Officer, and only if, they are satisfied that the person in question has adequate experience in the use of the machinery in question.
5. Physical movements within the workshops should be calm and unhurried in nature.
6. Long hair must be 'tied up', jewellery and loose clothing should be secured prior to using workshop equipment.
7. All commands, applying to, safety or the use of equipment given by members the Technical Staff should be obeyed.
8. All machines involving dangerous moving mechanical parts must be fitted with the appropriate safety guards/interlocks and should be inspected regularly by appropriately qualified staff.

9. Welding operations of any kind are to be carried out by technical staff only. Appropriate eye protection and gloves must be worn whilst welding. A clearance certificate must be obtained from the College Safety Officer before welding in any location other than the engineering workshop.

For those contemplating the use of our workshops further guidance may be found in the HSE book, "**Health and safety in engineering workshops**". Berkley Library, official publications section. (OPUB GB HEAC 14E:6 or OPUB GB HEAC 14J:1)

4.13 Electrical safety consultation (DSO).

Due to the variety of electrical appliances within the Department, electricity is a major hazard. Research supervisors and persons in charge of research laboratories have a responsibility to ensure that, new, or visiting research, staff have received appropriate training in electrical safety before authorisation of access to research areas and that good general working practices prevail within their research laboratory. The following electrical safety rules will apply to all mains-powered equipment used in research laboratories:

1. Alteration of or maintenance to any part of a building's electrical services may only be carried out by staff of the Estates and Facilities Office.
2. All new mains-powered electrical equipment must be inspected by suitably qualified personnel prior to installation.
3. Repair and servicing of mains-powered electrical/electronic equipment must be carried out by, or under the supervision of, qualified electrical/electronic technical staff.
4. All electronic circuitry constructed or modified within the laboratory and which will ultimately be either directly mains-powered or electrically coupled to mains-powered units must be tested by qualified technical staff prior to the mains power being switched on.
5. All research supervisors have a responsibility to carry out periodically, detailed assessment of risks associated with electrical equipment under their control and to ensure that all electrical equipment is tested and maintained on an appropriate and regular basis.
6. Hazardous mains-powered equipment undergoing modification or test must not be left powered and unattended without consultation with the responsible member of the technical staff.
7. Areas containing equipment capable of generating high voltages, which may on occasion be exposed, must display warning signs on the entrance doors.
8. Experiments involving electrical equipment, which operate overnight must be designed to be inherently failsafe and capable of safe shut down via the mains isolation switch.
9. The use of rotary transformers without suitable ELCB protection is expressly forbidden
10. Mains cables and plugs should be regularly inspected. Faulty cables are to be replaced immediately.
11. Extension cables and sockets must not be left on the ground. If this cannot be avoided the cable/s must be housed in a 'safety cable cover'.

4.14 VDU Safety Assessment:

Implementation of the Regulations on Computer Usage

The Safety, Health and Welfare at Work, (General Application) Regulations 2007, Chapter 5 of Part 2 outline the requirements that must be adhered to in relation to Display Screen Equipment. Under Safety Health and Welfare at Work (General Application) Regulations 2007, all persons working with Visual Display Units (VDUs or Computer Monitors), should have their workstation assessed to ensure that any

potential hazards related to poor ergonomics, unsatisfactory seating, poor lighting or glare etc. can be identified and rectified at an early stage.

Requirements

In order that such workstation assessments can be undertaken in practice, the department is obliged to have one person in their area trained as a VDU assessor (see Table page 1) who will then be competent to undertake these VDU workstation assessments in their work area

- **The Screen:** Characters and Image well defined no flickering, adjustable brightness and contrast, no reflective glare.
- **Keyboard:** Sufficient resting space for hands and forearms, it must rest on a matt surface, it must be detachable, it must be positioned such that the elbow angle is between 70-90 degrees, the symbols legible.
- **Seating:** Chairs should be stable and allow freedom of movement; it should have adjustable height and have a backrest which is adjustable in height and tilt, it should have casters. Feet should rest on the floor, or a floor rest should be provided.
- **Environment:** There should be sufficient space to change position & vary movement. Lighting should be sufficient the ambient light should be 300/500 lux, and if required have florescent light diffusers fitted. There should be no glare or reflection from the screen or surface of the desk. The VDU should not be positioned facing a window with the light facing the user or backing onto a window such that the sunlight reflects off the screen, it should be positioned side-on where possible. In the event that the position of the VDU cannot be changed blinds (vertical type is recommended) should be provided where needed. In relation to radiation; WHO advises that levels of radiation from VDU's do not pose significant risk to health, most radiation emitted from VDU's occurs from the side of the unit. Therefore it is recommended not to position a VDU such that it is located side on to another user.
- **Employees:** Employees are required to take a break within the hour of starting work using a VDU and each hour thereafter. Preferable before the hour has lapsed. They are advised to move away from the VDU for a period.
- **Eyesight testing:** Eye tests should be undertaken before users commence using a VDU. Any local Optician can be used, to have the eye test. The cost of the eye test can be recovered from the department provided that prior notice is given of the eye test. If the employee has social welfare (PRSI) eligibility to an eye test this must be claimed before making any claim on Department/College. Ideally such tests should be undertaken at regular intervals. In the event that a large number of staff need to be catered for this can be accommodated through the Student health services who will make arrangements with an optician. If an employee already wears glasses and routine changes of lens are needed, "if these glasses are adequate also for VDU work, then the Department is not liable for the cost". Claims costs for should be submitted in advance with a copy of the prescription to the Head of Discipline who may then seek verification of the prescription from the College Occupation Health Service provider.
- **Further Information:** For further information of all these issues the College safe Working with VDU's web site can be accessed at the following link <http://www.tcd.ie/Buildings/newsite/safetyworkingwithvdus.php>

Note: Laptops are not covered under these regulations. Where laptops are used they should have docking stations where the keyboard is detachable. If by the owners choice they wish to use a laptop they must sign off on its use.

Section V: External Activities

5.1 Field Trips / Industrial Visits PROTOCOL

Fieldwork is defined as any practical work carried out by staff or students of the University for the purpose of teaching and / or research in places which are not under University control, but where the University is responsible for the safety of its staff and students and those exposed to their activities. All Persons in the Department involved in organising Field trips must read the Field Trip Safety handbook prior to undertaking fieldwork.

Any person(s) undertaking fieldwork whether, Staff, Postgraduate Student or Undergraduate Student, must firstly consider the proposed fieldwork, students must discuss the proposed fieldwork with his/her Academic Supervisor and have their consent prior to undertaking any work. Similarly, any associated laboratory work should be agreed upon by the relevant Academic Supervisor before being undertaken. All have a legal responsibility to take due care, safe practices must be adhered to at all times. If any questions arise and students cannot contact their Academic Supervisor please contact the Head of Discipline or the Discipline Safety Officer.

The following activities could be considered as examples of fieldwork. Surveying, Sampling in all disciplines on land, in water and in air; industrial visits to factories, visits to/working with external research partners etc.

The risks involved in voluntary and leisure activities are not included in any Fieldwork Safety Statement. However, staff and students on residential fieldtrips should be aware of the particular risks inherent in spending recreational time in unfamiliar locations, particularly bars and clubs, and in travelling to and from those locations and their place of temporary residence. All residential fieldtrips are advised to take necessary precautions during their recreational time, and students must keep staff on fieldtrip informed of their plans.

1. **Safety is paramount.** Field trips must follow all safety rules and regulations indicated by the trip leader based on the respective protocols laid down in the Department Safety Statement.
2. Field trip leaders will establish regulations for specific trips and will make final decisions regarding any proposed activity as appropriate. Participants will be expected to comply with all rules and regulations established by the trip leader.
3. Students are required to complete the appropriate student health form and make field trip leaders aware of special health conditions and medical needs.
4. The Head of Department must ensure that workers are not only adequately trained but also adequately informed. There is also a duty on the fieldwork participants to take reasonable care for their own safety and that of those affected by them

It is the responsibility of the Head of Department to ensure that a risk assessment for all fieldwork is made and to ensure that a safe system of work has been established for all staff and students. Risk Assessment Forms must be filled out by fieldtrip leaders and signed by Head of Disciplines or someone assigned by him.

Frequently the Head of Department will delegate this duty to the member of staff organizing the fieldwork. In such circumstances the Head of Department must be satisfied the person to whom has been delegated has the competence to lead and has sufficient awareness of the legal situation to those under supervision. The Head of Department must ensure that the fieldwork meets the safety criteria of the

Department and that, accidents are reported and investigated. Some staff and students may be unable to carry out certain types of fieldwork due to physical or psychological problems and early identification of such problems is essential. Therefore it is compulsory to have all forms supplied filled in by each participant.

Appendix III – Risk Assessment Forms

A Risk assessment template for laboratory or field work can be downloaded from the link below:

<https://sites.google.com/site/tcdcivillab/healthsafety/-project-safety-statement>

A completed statement must be signed by your Supervisor and the Chief Technician before practical work is undertaken. Example risk of the statements are provided in this appendix.